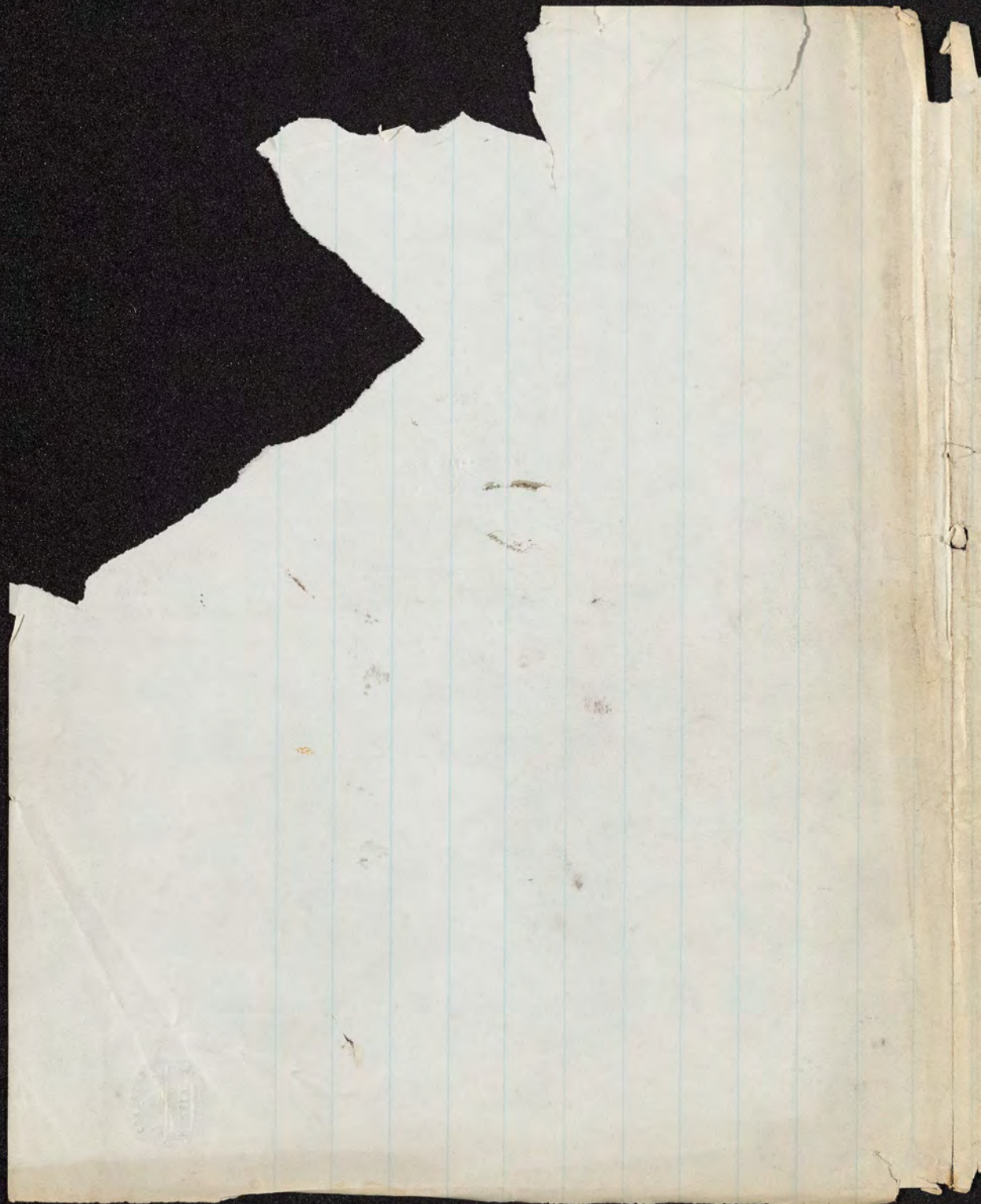




3

Disinfection

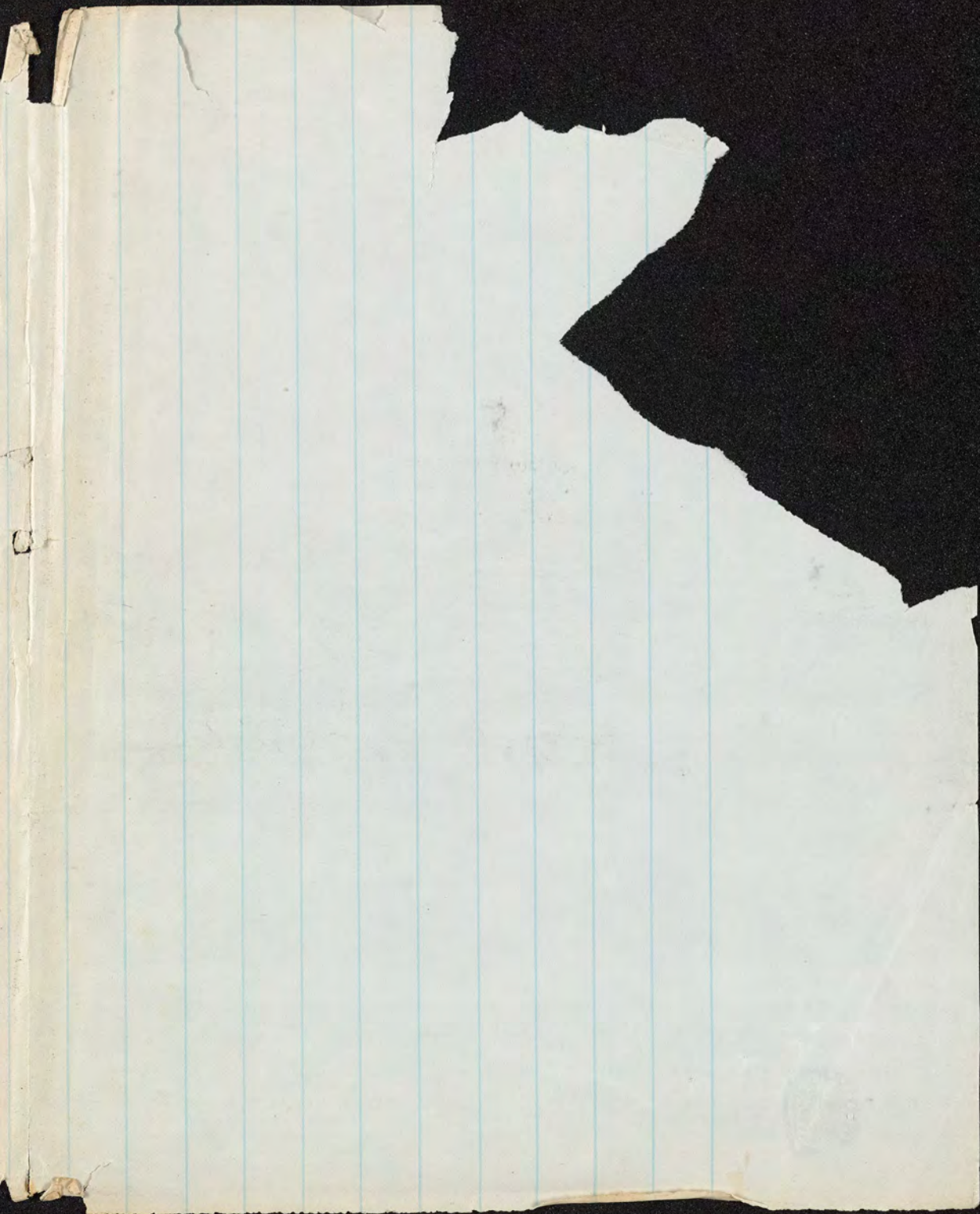
Habitations

Hospitals

Seasons



~~Exp Tar  
Chloride Lime  
Lobamycin  
Sol. Carb. Acid  
Crude Potassium Pot.  
Sol. Potassium Pot. lance bottle  
Sulph. Iron~~





are very injurious.

Sever gases are worse than others in producing epidemics, <sup>& intensify</sup> ~~not~~ causing them.

Fetal matter thrown on the ground is injurious. <sup>Cambs so.</sup> The dung of other animals is not as bad as our own. To every animal, its own excrement is the worst.

Air from streams receiving the contents of sewers, is bad. The English Parliament was once driven from London by the smell of the Thames. <sup>Harrison's Almanac 1871-2.</sup>

Making manure of fetal matter is not injurious. <sup>Dr. J. J. H.</sup>

Grave-yard air is very bad.

Effluvia from slaughter-houses is not as bad as might be expected.

<sup>Bodies of horses (sometimes) on battle fields, Romilly's study.</sup>  
The air of brick fields is bad and has caused deaths. <sup>Only in the London area.</sup>

Candle, glue, & bone works &c. are unhealthy and should be isolated.

The next subject is, how to re-

FETAL MATTER.

AIR FROM STREAMS

MANURE.

GRAVE-YARD AIR.

SLAUGHTER HOUSES.

BRICK FIELDS.

MANUFACTORIES.

more or less



A  
A

Odorous substances, as

Clove, burnt sugar, &c, — merely disguise,much, & do not improve the influence of foul air.

Sp. Camph. as effective as any in that way;

next to it, freshly roasted or burnt coffee grains.  
of Antegazza is right about the ozogenic property of aromatic oils,  
there may be a certain amount of virtue in some of them.

Dry earth; Earth closets.

Lime, absorbent

Charcoal — porous &amp; absorbent

(should be mentioned first, after fresh

Air &amp; water)

Tar — wood tar or Coal tar.



obviate the evil of

i.e. free passage of air, not only more exposure to air. E.g. T.R. can bring.

move these impurities.

DISINFECTION.

1st. "Prevention is better than cure."

2nd. Ventilation which is a thousand times better than the next which is

INACCURACY OF THE TERM.

3rd. Disinfection. This is not an accurately term. <sup>used</sup> They do deodorize. Some things deodorize and do not disinfect. They do not ~~for~~ destroy the specific poisons; they do not stop the contagion. <sup>of infection</sup>

FRESH AIR.

Fresh air <sup>in free movement</sup> is the first disinfectant.

WATER.

2nd. Water (abundantly). A thunder

Soap

storm is often of great value.

CHLORINE

Chlorine is the most important artificial means. Chloride

CHLORIDES OF LIME AND SODA.

of lime is the most available. Chloride of soda is excellent. Its emanation is greater. It is not very expensive. During cholera it should be poured daily in the water-closets, <sup>basins and</sup>

Some other disinfectants

LIME

Lime is good

CHARCOAL.

Charcoal is very good. It is very porous and absorbs gases,



~~To Dental College~~  
 To deodorize breath — or other species (pastilles)  
 t. mynch. — 1 gr. in 331, wash  
 charcoal — 90. in 331, then  
 permang. potass. — 1 gr. in 331, then  
 chlorate potass. — 90. in 331, then  
 Labarraque's li. diluted — 331 in 331  
 t. 331 in 331

Regulate secretions  
 & digestion  
 attend to decay of teeth  
 & cleanse teeth frequently & thoroughly  
 removing deposits

Chloralum — & Chlorozone: the latter a combination of a permanganate with a chlorate alkali (Hoad praises it in England)



OZONE.

For Hospital Wards: pure Bromine.  
Ozone disinfection is open to speculation & experiment.

## Composition of Disinfectants

RIDGEWOOD'S  
DISINFECTANT.

Ridgewoods: carbolic acid 5-8, lime 5

Mc DOUGALL'S.

Mc Dougall's: sulphites of magnesia & lime, & carbolic acid

DEMEAUX'S.

Demeaux: equal parts of tar, alcohol, & potassa.

RENEWAL  
OF THE AIR.

Renewal of Air comes next.

HYGIENE  
OF  
HABITATIONS.

This naturally includes the consideration of light, heat and air, which may be best studied under the heading: Hygiene of Habitations.

SITE

The site should be on a hillside not too steep, and on the slope towards the south & west (in the U.S.)

SOIL

The soil is important in absorbing heat, light & water, in its chemical nature.

HERBAGE.

Herbage is favorable.

SAND

Sand radiates heat slowly.

REFLECTION

Reflection of light will depend on







BROMINE

Richardson says it is the best. Bromine <sup>has been</sup> is more used in ~~this~~ country. Dr. E. Smith, U.S.V. +

HIGH HEAT AND COLD.

High heat & cold are the only truly perfect disinfectants. Heat destroys organic matter, and cold prevents its action.

HEAT

~~See my notes~~ Lecture XVII. In this lecture, we will consider heat as a disinfectant.

ANCIENT TIMES.

In ancient times, fires were burnt to drive away plague. Pliny said it had a medicating power.

PLAGUE & OTHER DISEASES.

Plague stops in the East, when the heat is <sup>most</sup> intense.

Dr. Henry of <sup>Alexandria</sup> England proved that at a certain temperature, vaccine virus, small-pox, scarlet & typhus fever lost their power; under 300°.

CLOTHING.

Clothing is not injured by a heat which will disinfect. Not over 300°.

Flame has a temperature of 1100°  
 hot air <sup>bath is endurable with</sup> 250°; steam 150°; dry vegetable tissue 212°; sulphur ignites at 550°  
 will bear



\* Crookes, Ed. of London Chemical News  
has experimented largely on Disinfectants. He asserts the  
great superiority of antiseptics ( $\text{SO}_2$  & Carbolic acid)  
over "deodorizers" - as chlorine. The latter destroys  
the results of decomp., - the former prevents  
the process - kills (he says) the germs of "virus."

1. ~~absorbing~~ gases - lime, charcoal, earth.  
2. Destroys emanations - as Nat. of lead,  $\text{S H}_2$ , & chloride of iron the same.

3. Decomposes organic matters  
as chlorine, Iodine, Bromine,  
Potassium, Potassa. More experiments, 1866,

End of 16th Lecture, 1870.

4. Arresting septic changes - fixing albumenoid principles by combining with them, or  
abstracting oxygen, or water from them.  
as  $\text{SO}_2$  Carbolic Acid - Chloride of Zinc, Sulphate of iron - Carbolic  
acid, Heat.

5. Killing organic germs, & disintegrating infectious & contagious viruses.

Quantities of disinfectants: - see my notes -

LB



Living in Hospital in Berlin - prepared from 61  
 also a ~~extinguished~~ by heat and 3 drop 4750°F.

Dr. Ferguson cleaned & heated ships  
 infected with yellow fever. Dr. Bell, ditto.  
 Heat, as before said, is the only  
 perfect disinfectant.

Cold is temporarily a perfect  
 disinfectant. It arrests organic  
 processes & changes, of life & decay.

### Recapitulation.

modes of action  
 of disinfectants  
 (cures)

For disinfecting privies:

(Tar) Sulphate of Iron (1 lb. to a gal. of water),  
 chloride of lime, & of zinc, perman-  
 ganate of potassa ~~gr & in 1000~~

For Solid Filth:

Cover with charcoal, quicklime or  
 dry earth.

For Clothing

A weak  
 of potas

For Rooms

Ventilate

soda, chlorine

Sulphur

nom

For Furniture

disinfectant, when he utterly scorns  
 tary medicine. In the second place, I have not yet  
 seen any proof that these substances are superior to our  
 ordinary disinfectants, but much evidence to the con-  
 trary.

H. C. W., Jr.

CURATIVE ACTION OF IPECACUANHA IN DIARRHOEA.  
 —Dr. Thorowgood, before the Clinical Society of Lon-  
 don (*Lancet*, May 24), read notes of two cases of persist-  
 ent and alarming diarrhoea which yielded promptly to  
 doses of from two to five grains of powdered ipecacu-  
 anha thrice daily, after having resisted all ordinary  
 treatment.

SHIPS

COLD

PRIVIES.

SOLID  
FILTH.

CLOTHING

ROOMS.

FURNITURE.

R  
E  
C  
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N





Crookes, Ed. of London Chemical News has experimented largely on Disinfectants. He asserts the great superiority of antiseptics ( $\text{SO}_2$  & Carbolic acid) over "deodorizers" — as chlorine. The latter destroys the results of decomp., — the former prevents the process — kills (he says) the germs of "virus."

1. ~~absorbs~~ gases — lime charged with carb.

2. Destroys evaporation — as Nit. of lead,  $\text{SH}_2$ , & chloride of iron the same.

3. Decomposes organic matters as chlorine, Iodine, Bromine, Potassium, persulphate. More experiments, 1866.

End of 16th Lecture, 1870.

4. Another Septic changes — fixing albuminoid principles by combining with them, or abstracting oxygen, or water from them. as  $\text{SO}_2$  (Carbolic Acid — Chloride of Zinc, Sulphate of iron — Carbolic acid, Heat.

5. Killing organic germs, & disintegrating infectious & contagious viruses, as Carbolic acid, Heat.

Quantities of disinfectants: — see my notes —

The most convenient known test of the activity of an antiseptic — i.e. a destroyer of disease-germs — is believed to be its power of killing bacteria and similar low forms of vegetable life. Now, the experiments of the great advocate for the use of carbolic acid (Dr. Sansom) have shown that a large number of substances are more active in destroying microscopic organisms than is carbolic acid, and that the corrosive sublimate is about eight times as strong, one part of the mercurial salt in 6000 parts of water sufficing to kill organic germs, whilst one part of carbolic acid in 750 parts of water is required for the same purpose.

Dr. Parkes —

(2)

[Lms  
cont  
1868]



Living - also a Hospital in Berlin - purposed fever 61  
 exterminated by heat and 3 drop to 150°F.

SHIPS

Dr. Ferguson cleaned & heated ships infected with yellow fever; Dr. Bell, ditto.

COLD

Heat, as before said, is the only perfect disinfectant

Cold is temporarily a perfect disinfectant. It arrests organic processes & changes, of life & decay.

### Recapitulation.

Modes of action

of disinfectants \*

(cures)

For disinfecting privies:

PRIVIES.

Sulphate of iron (1 lb. to a gal. of water),  
 chloride of lime, & of zinc, perman-  
 ganate of potassa

SOLID FILTH.

For Solid Filth:

Cover with charcoal, quicklime or dry earth.

CLOTHING

For Clothing:

A weak so-  
 of potassa

ROOMS.

For Rooms:

Ventila-

soda, chloride

Sulphur

nom be

Chlor.

FURNITURE.

For Furniture: dilute crown of urine

"TO THE EDITOR OF THE PHILADELPHIA MEDICAL TIMES:

"Edward McN., a sober, industrious shoemaker, working at home, was somewhat depressed by the loss of a child, and the next day was himself taken sick with purging, vomiting, and cramps in the stomach and legs. The stools were liquid faecal matters at first. His wife gave him boiled milk and water to drink, and the subsequent passages consisted of diluted milk, with little or no change of color (alkaline in reaction). The matters vomited had the same appearance, and were not bitter.

"The next morning, on being summoned, I found the patient partially collapsed. I immediately administered morphia sulphate—gr. 4—hypodermically, and pre- scribed a mixture containing bismuth and morphia, to be taken at short intervals, with aromatic sulphuric acid to be added to the water which I



\* Crookes, Ed. of London Chemical News  
has experimented largely on Disinfectants. He asserts the  
great superiority of antiseptics ( $\text{SO}_2$  & Carbolic acid)  
over "deodorizers" — as chlorine. The latter destroys  
the results of decomp., — the former prevents  
the process — kills (he says) the germs of "virus."

1. ~~absorbing~~ <sup>lime</sup> ~~gases~~ — lime ~~chemical~~ <sup>earth</sup>  
2. Destroys emanations — as Ht. of lead,  $\text{SH}_2$  & chloride of iron the same.

3. Decomposition of organic matters  
as chlorine, Iodine, Bromine,  
Potassium, Potassium, Potassium. More experiments, 1866.

End of 16<sup>th</sup> Lecture, 1870.

4. Antiseptic changes — fixing albuminoid principles by combining with them, or  
abstracting oxygen or water from them.  
as  $\text{SO}_2$  Carbolic acid — Chloride of Zinc, Sulphate of iron — Carbolic  
acid, Cold Heat.

5. Killing organic germs, & disintegrating infectious & contagious virus, as Cold Heat.

Quantities of disinfectants: — see my notes

Dr. Jeannel (L'Union Médicale, tom. xii.) arranges  
the disinfectants as follows:

of 1. Oxidizing Agents—air, oxygen, ozone, hyponitric  
acid.

th 2. Dehydrogenizing Agents—chlorine, hypochlorites,  
iodine, bromine.

n 3. Deoxidizing Agents—sulphurous acid, sulphites,  
hyposulphites. ①

tl 4. Desulphurating Agents and Coagulators of Albu-  
minous Matters—lime, salts of alumina, of zinc, of  
lead, of iron.

5. Antiseptic Agents, which kill germs—carbolic acid,  
its congeners and substances containing it, thymic acid,  
etc.

6. Absorbing Agents—charcoal.

Crookes —



Living - <sup>also a</sup> Hospital in Berlin - purposed fever 61  
extinguished by heat and 3 drop to 75°F.

Dr. Ferguson cleaned & heated ships  
infected with yellow fever: Dr. Bell, ditto.

Heat, as before said, is the only  
perfect disinfectant

Cold is temporarily a perfect  
disinfectant. It arrests organic  
~~processes~~ changes, of life & decay.

### Recapitulation.

modes of action  
of disinfectants \*  
(cures)

For disinfecting privies:

(Far) Sulphate of Iron (1 lb. to a gal. of water),  
chloride of lime, & of zinc, perman-  
ganate of potassa gr. & in  $\frac{1}{2}$  in

For Solid Filth:

Cover with charcoal, quicklime or  
dry earth.

For Clothing:

A weak solution of permanganate  
of potassa: gr. & or less in  $\frac{1}{2}$

For Rooms:

Ventilation, nitrate of lead,  
chloride of lime, white wash,  
Sulphurous & Nitrous acids (if the  
room be unoccupied)

For Furniture: dilute chloride of lime

SHIPS

COLD

PRIVIES.

SOLID  
FILTH.

CLOTHING

ROOMS.

soda

Chlor.

FURNITURE.

R  
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Pneumatic  
 air tight power-  
 class apparatus. Formally  
 adopted for exclusive use of children  
 by Board of Health - to be used from  
 April 1876. Expense to be paid from  
 other methods.

See  
 Woodworth's  
 Marine Hospital Report  
 1873 - pp 102, 103, 108  
 on Success of Sanitary Police, es-  
 pecially disinfection; N. Orleans,  
 Mobile, & N. York - 1873;  
 against Yellow Fever, -

End of 17<sup>th</sup> Lecture 1874.

In Lectures at University - begin to use my other notes  
 with Influence of Light on Health,  
 if not sooner.



color. Glare injures.

# ABSORPTION

Sand absorbs little water; clay, more; humus, the most.

# PERMEABILITY.

Soils differ in permeability. The most so, are sandstone, chalk &c.

Very porous soils are healthy, as they insure dryness.

# AIR

We know little of the passage of air through soil.

# DUST.

Dust is injurious to the eyes.

# COMPOSITION.

The chemical composition of soil affects the water & the air. We cannot say that any one soil produces malaria.

# MARSHES.

Marshes, regularly overflowed, are almost ~~not~~ unhealthy; by dampness, if nothing else.

Sand with clay under it, is bad

# GOOD SITES.

Sites on granite, trap, sandstone, & gravel, are good; clay, slate, & limestone, generally?

# IRRIGATION.

Alluvial soils are <sup>usually</sup> objectionable. Irrigation is very bad. Rice fields are very malarious.

# BRUSHWOOD.

Brushwood is objectionable



Space of 1/2 page

Russia - <sup>part of</sup> Pop. and side of street  
 Jefferson  
 Barnacks  
 Missouri



TREES.

Trees, if not too many are good. Their need differs with climate. They often keep off malaria.

SUN & SHADE.

If too many, they keep out light. Light is indispensable. Those who live in mines have very low health. Lewis says that in 1849-51, 5 cases of cholera were on the shady side of a street, for 1 on the sunnyside.

Florence Nightingale in hospitals.

THE HANCOCK GIRLS' GRAMMAR SCHOOL.—Mrs. Mary Hunt, who has been a Principal of girls' grammar schools in Philadelphia since September, 1852, closed her connection with the Hancock Girls' Grammar School last week. Her retirement from the Principal's chair was the occasion of a demonstration by the pupils of the school. During Mrs. Hunt's twenty years' term of service in the public schools, there have been 3129 pupils under her supervision, 244 young ladies have been sent by her to the Girls' High and Normal School, and 25 of them are now teaching in the public schools.

this in

DIO LEWIS.

Dr Lewis is in the importance of advises sun-

g the even

DEATH OF AN OLD CITIZEN.—Samuel McDougall, well known to old theatre-goers, died on the 27th of September, aged 82 years. Mr. McDougall was for several years door-

TAX ON WINDOWS.

In England formerly windows were taxed. English climate not sunny.

Every house should be so constructed as to receive sunlight.

BUILDING MATERIAL.

Building-Material is important.

WOOD.

Wood is very good. It is porous allowing thorough aeration. except floor & walls.

STONE

There is no objection to brick wood & stone which are porous.

BRICK.

WALLS.

Walls need not be thick, but dow



A CORRESPONDENT of the Builder states he had occasion to examine rooms occu-  
 pied by young ladies for manufacturing purp-  
 and he has observed that while the workers  
 in one room would be very cheerful and health-  
 y, the occupants of a similar room, who  
 were employed on the same kind of business,  
 were all inclined to be melancholy, and com-  
 plained of a pain in the forehead and eyes,  
 and were often ill and unable to work. The  
 only difference he could discover in the rooms  
 was that the one occupied by the healthy  
 workers was wholly whitewashed, and that  
 occupied by the melancholy workers was  
 colored with yellow ochre. As soon as the  
 difference struck him he had the yellow ochre  
 washed off the walls and then whitened. At  
 once an improvement took place in the health  
 and spirits of the occupants.

Space of 4 paces

Russian -  
 Jefferys -  
 Banquets  
 Harrison

side of street



TREES.

Trees, if not too many are good. Their need differs with climate. They often keep off malaria.

SUN  
&  
SHADE.

If too many, they keep out light. Light is indispensable. Those who live in mines have very low health. Lewis says that in 1849-51, 5 cases of cholera were on the shady side of a street, for 1 on the sunnyside. Florence Nightingale observed this in hospitals.

DIO LEWIS.

Dio Lewis is enthusiastic in urging the importance of sun light. He even advises sun-baths.

TAX ON  
WINDOWS.

In England formerly windows were taxed. *English climate not sunny.*

Every house should be so constructed as to receive sun-light.

BUILDING  
MATERIAL.

Building-Material is important.

WOOD.

Wood is very good. It is porous allowing thorough aeration. *except deep woods.*

STONE

There is no objection to <sup>brick</sup> ~~wood~~ & stone which are porous.

BRICK.

WALLS.

Walls need not be thick, but down



Vatikan, <sup>now</sup> chorale? <sup>hairs!</sup>



66. Plaster dath at least apart from outer wall.

There should be plenty of windows and doors; in an hospital, 1 for 2 beds.

FOUNDATION.

Foundation is important. Cellars should be deep to allow air to circulate and to prevent dampness. A flooring of zinc is occasionally put on the 1st floor to prevent moisture rising.

WOOD FLOOR.

Wood is the best kind of floor. Stone is good in warm climates.

TILES.

Nest to wood come tiles.

ROOFS.

Roofs should slope, or be.

METHOD OF WARMING.

Method of Warming.

The ancients had no need of care. They first had a fire in the middle of the floor & no smoke opening. Tent came flues for distributing heat. > My notes here <

DIOCLETIAN

Diocletian had his palace heated by pipes (subject to leakage).

MIDDLE AGES.

In the Middle Ages recesses were made in the wall.



WattSunday



CHIMNEYS.

Chimneys were invented by the  
Italians in the 14th century.

STEAM

HOT WATER.

Steam heating was used in England.  
Water stoves were used by the Egypt-  
ians to hatch eggs.

FRANKLIN STOVE.

Franklin made the 1st. stove in  
America. It had an open grate  
& the air was supplied from  
beneath. It was a perfect vent-  
ilator but not a good heater.

Open fire It heat only the part turned  
to it. (by radiation.)

PRESENT  
STOVES.

The present stoves heat by radiat-  
ion & by convection (currents of  
air) They poorly ventilate. They  
require water as they dry the  
air.

HEATERS

Heaters, to warm several rooms  
are used now.

LATROBES.

Latrobe stoves set in the wall, are  
very good.

HEATERS  
DO  
NOT  
VENTILATE.

Heaters in the cellar are now  
universal. They do not ventilate.  
If the parlor door is shut & the



Leeds plan at Capitol, Washington.

1st floor small heating -  
proposed

End of 17<sup>th</sup> Lecture 1870

$$\begin{array}{r} 242 \\ 2 \overline{) 484} \\ \underline{484} \\ 0 \end{array}$$

$\frac{1}{2}$

0/0

38



flue is open, the air will get compressed & cause headache. If the window be opened, the current will be outward.

The heater should have air-chambers supplied from out of doors.

Houses should have open fire-places even if they be not used.

Even Entries should be heated.

There is sometimes 20° difference at the head & at the feet: cold currents are bad.

There is no objection to steam & hot water pipes. They require secondary means of ventilation.

Ventilation is the next subject.

and if you will have a good draft, uses 350 cubic

flame will point inwards from the current of cool air which comes from without. A more certain way to secure the proper amount of fresh air is to have an opening on opposite sides of the room, so that the air will circulate through the chamber as much as possible. Remember not to have the current play over the bed on which the person lies sleeping, as the person might catch a cold. But if there is no other way, and some rooms are so constructed that no other means appear possible, it is better to open the windows and escape the effects of the "draught," by putting an extra covering over the person. Should there not be two windows in the chamber, raise the only one you have and open the door a little. If no means suggests itself to you by which a desirable amount of pure air can be permanently secured, bear the matter in mind, and some day when your physician comes in, ask him about it. Persons who habitually sleep in such badly ventilated houses are seldom compelled to wait long for an opportunity to ask a physician such things, as it

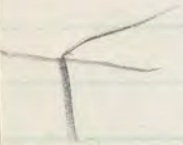
It is the av-  
A sick ward, for perfect venti-  
lation, requires 3 or 4000 cub. ft.  
his? of air to pass through  
it per hour.  
gases. We can

the advantage  
apparatus on

AIR  
CHAMBER.

A OPEN  
FIRE-PLACES.

ENTRIES.



VENTILATION.

Pure air—  
little risk  
of catch-  
ing cold.



Leeds plan at Capitol, Washington.

2 floor small heating -  
proposed

End of 17<sup>th</sup> Lecture 1870

Now the question is, how much pure air does it require to answer this purpose? You may have some idea of it, when you remember that an ordinary man spoils not less than a gallon of pure air every minute. This is sixty gallons an hour, or near five hundred in eight hours. In round numbers, about *twenty-five flour-barrelfuls of pure air are required in a single night, for breathing purposes alone.*

Gallon of  
pure air  
spoiled  
every mi-  
nute.

2000 cub. ft.  
per hour per  
head - for good  
ventilation

Gas-burner consumes 11 gallons a minute.

U.S.A.

Not only is the air of a room made impure by breathing, but it is made impure by the gas we burn as a light. It is estimated that an ordinary burner consumes as much air as eleven men would do: that is, one gas-burner in three-quarters of an hour consumes as much air as would answer a man for a whole night.

If there is an ordinary stove in the room, it destroys as much air as would twenty-five men. All these things and estimates must be thought of when you hesitate sometimes about putting up or letting down a sash of lights a few inches.

Stove consumes 25 gallons a minute.



flue is open, the air will get compressed & cause headache. If the window be opened, the current will be outward.

AIR CHAMBER.

The heater should have air-chambers supplied from out of doors.

AIR OPEN FIRE-PLACES.

Houses should have open fire-places even if they be not used.

ENTRIES.

Even Entries should be heated.

There is sometimes 20° difference at the head & at the feet: cold currents are bad.

There is no objection to steam & hot water pipes. They require secondary means of ventilation.

VENTILATION.

Ventilation is the next subject.

In 24 hrs., an adult uses 350 cubic feet of air. 1500 cub. ft. is the average for hospitals.

DIFFUSION OF GASES

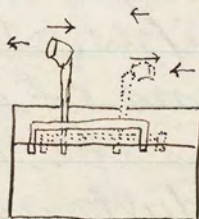
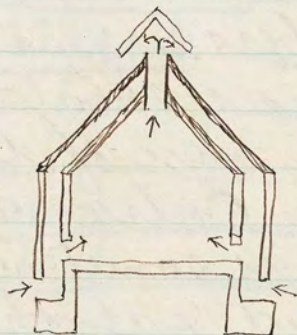
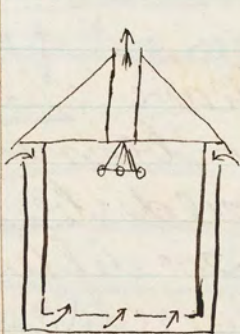
How are we to get this? *A sick ward, for perfect ventilation, requires 3 or 4000 cub. ft. of air to pass through it per hour.*  
But the diffusion of gases. We cannot control this.

WINDS.

2. Winds. We can take advantage of them as in the apparatus on chimneys.



End of 18<sup>th</sup> Lecture





3. Diff. of temperature in diff. parts of atmosphere. 4. Plants 75

NATURAL  
&  
ARTIFICIAL  
VENTILATION.

There are two modes of ventilation called the natural & the artificial. These terms are inaccurate. Whatever is not merely mechanical, as fans, steam power, &c., is called natural.

### Lecture XVIII.

DIFFICULTY  
OF THE  
SUBJECT.

The principles of ventilation are easy, but their practical application is difficult.

We want to remove the effects of respiration & to get a fresh supply of air.

EGYPTIANS.

The Egyptians had holes in the pyramids, intended for ventilation. The Romans had bellows in mines.

ROMANS

FIRE-PLACE  
AND FLUE.

The fire-place & flue were first used in the old English House of Commons.

FAN.

In 1679 the fan was used in Europe.

AIR-PUMP.

In 1720, the air-pump was used in mines.







The principles of ventilation are as follows:

DIFFUSION  
OF GASES.

Diffusion of gases. This is a natural way to equalize the air.

WINDS.

Winds, are caused by differences of temperature.

HUMAN  
BODY.

The human body is always giving off heat. This produces an upward current, as the cold air forces it up. This is illustrated in the pneumatic trough.

ROOM WITH  
ONE OPENING AT  
THE TOP.

If a room has one opening at the top, & the air without is colder, there will be no escape.

GREATER  
DENSITY  
OF COLD AIR.

The principle of the greater density of cold air is used in ventilation. Fires in winter secure something of this.

TROPICAL  
CLIMATES.

In tropical climates, there is little upward current. Hence artificial means have to be resorted to.

A room is ventilated by any kind of opening.

SANITARY FAIR.

At the Sanitary Fair, there was



x  
^

What becomes of the breath? Expand: ~



an old-fashioned fire-place. The opening extended above the head. The products of respiration went right up the chimney.

EFFECT OF  
ECONOMY.

Economy has caused the loss of ventilation. It is a great mistake to close up chimney places. They are better than windows.

FL. NIGHTINGALE.

Florence Nightingale believed in large fire-places.

WINDOWS.

Windows require care. There may be too rapid an entrance of air. They should have double sashes. Windows are best when they go from the floor to the ceiling.

TALL  
ONES.

HEIGHT  
OF CEILINGS.

Ought ceilings be very high? Florence Nightingale thinks not; that organic matter will collect above the top of the windows.

This view is wrong. The law of the diffusion of gases would act here as in any other case. 

EUROPEAN  
CATHEDRAL.

The Cathedrals of Europe have very high ceilings yet they are remarkably



80

*[Handwritten scribble]*



pure, They have little provision for ventilation.

*San Spirito*

One of the loftiest hospital wards is in Rome. It is 70 ft. high & the windows are 20 ft. from the ground.

The two hospitals: Episcopal Hospital & Mechanics Hall, are entirely different. The former has a low ceiling, & the latter, a high one.

In the former the air was foul in the latter it was pure. Hence

Ceilings cannot be too high. However outlets are good at the ceiling.

INLETS  
AND OUTLETS.

Inlets & Outlets, is the next subject. Franklin had an opening above the mantel-piece. This has since been applied to by Arnot.

MINIMUM,

The minimum amount of inlets and outlets, according to Parkes is 48 sq. inches

WHAT  
SIZE?

Should inlets & outlets be the same size? Parkes says the outlets should be the largest. Harris and Leeds say

LOFTY  
HOSPITAL.

EPISCOPAL  
HOSPITAL  
&  
MECHANIC'S HALL.

1862







PURE AIR.

that the inlets should be in excess.  
The air must be pure. The pipes need not be long. The openings should turn upwards.

WIRE GAUZE.

In windows, a pane should be replaced with wire gauze. It breaks the force of the air, and tempers it.

RESPIRATORS.

Respirators are made on the same plan

OPEN WINDOWS.

If windows are open, the draft should be broken, as by a curtain, furniture, &c.

HOW MANY OPENINGS?

How many inlets should there be? If we have 2 windows, it is better to have each open  $\frac{1}{2}$  in. at top & bottom, than to have one open 1 in. at the bottom.

WHERE TO HAVE THEM?

Where should they be? The inlet may be at the ceiling, middle, or floor.

If cold air is introduced, the opening should be at the top; if warm, at the bottom.

OUTLET.

Where should the outlet be?



Warm air coming in below on one side &  
going out below on the other, best. Only,  
make sure that it does go out there. By & -

The chimney of the fireplace in the room, —  
or, by a longer pipe, the kitchen chimney may be made  
to induce an air ventilation current. — (See Lesson)



COLD INLET  
BELOW.

Suppose cold air is introduced at the bottom. If the outlet on the opposite side is at the floor, there will be a current of cold air sweeping along the floor.

WARM INLET  
ABOVE.

If warm air comes in at the top, & the outlet is at the top, there will be a current of warm air along the ceiling.

WARM INLET  
BELOW.

If warm air comes in at the bottom and goes out at the top of the opposite side, it will go up the wall and along the ceiling.

COLD INLET  
BELOW.

If cold air comes in below it should go out above. If warm air comes in above, it should go out below.

DISSECTING  
ROOM.

In the dissecting room <sup>of M. Duchatel</sup>, an outlet is made under the dissecting table.

ARMY  
HOSPITALS.

A similar plan is adopted in army hospitals. They have a shaft with a flue in it, just back of the water-closet.

CHANDELIERS.

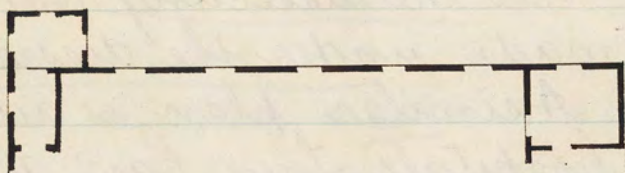
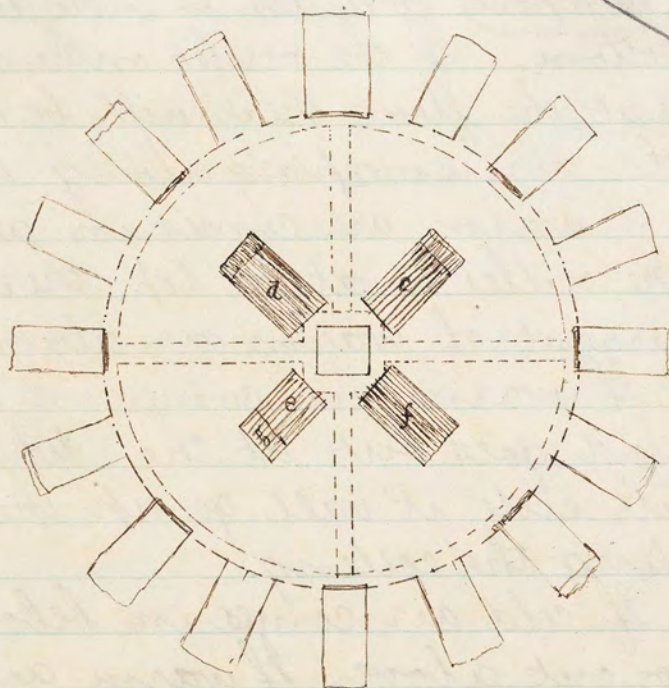
Chandeliers are used to ventilate. The Argand lamp is an example.

RIDGE,

Ridge ventilation was first used in the Crimean War. It is perfect in summer but not in Winter.



End of



should  
be  
nearer  
together





LEEDS'  
SUMMER  
CONTRIVANCE,

19 Lecture

DR. ARNOT

Mr. Leeds had a stove in the centre of the room and surrounded by a box, & air introduced from below. Gradually, holes were cut in the box to allow radiation of heat. At last instead of a box, a pipe poured air just on the top of the stove.

Dr. Arnot contrived a method of using wind ventilation. He had two pipes each with a cowl, one turning to, & the other from the wind.

One caught the air and distributed it through the building & the other sent it back again. Barker's patent;

at F. Institute, Reading Room; successful; & in Pyroasts Lecture room, new University building, West Phila.

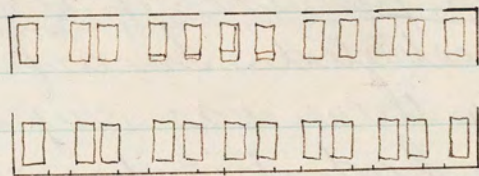
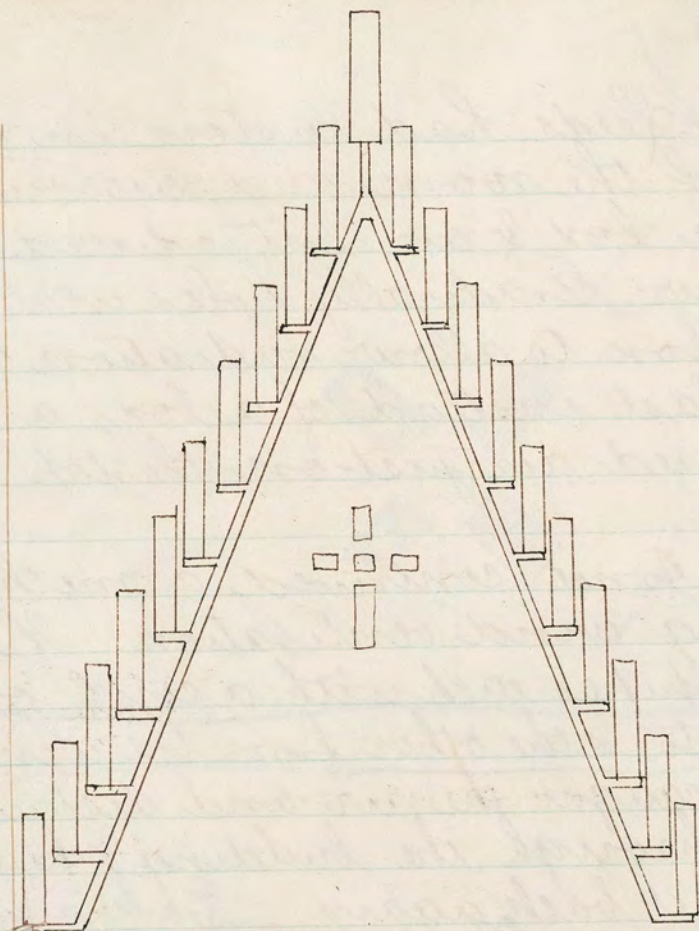
The importance of ventilation may be illustrated. In a factory at Manchester there was very bad air. The owner had it improved. The consequence was, <sup>a demand for</sup> an increase of wages caused by the workmen having better appetites.

A certain club, eat  $\frac{1}{3}$  more at their annual dinner, after the club room

FACTORY  
AT MANCHESTER

CLUB  
ROOM.





Dr Kinkhadas —



FACTORY AT GLASGOW.

was improved.

A manufacturer at Glasgow had his men lodged in poor houses. Typhus fever was the result. He had the place improved so as to allow a good supply of fresh air when typhus disappeared entirely.

TENEMENT HOUSES OF NEW YORK.

Nothing illustrates it better than the tenement houses of New York. The bed rooms are in the centre, and have no windows.

A house in 44th St. in which in 1870 a number of glass told me he knew 67 families to reside together.

Recapitulation.

NATURAL VENTILLATION

Natural plans: winds, cowls, double funnels, windows &c. Panted shafts, pipes or flues, as

MIXED.

Mixed plans: those used in Mines, <sup>some</sup> Hospitals, ships, houses of Parliament, &c.

ARTIFICIAL.

Artificial: fans & pumps &c.

FANS.

The fan may have straight or curved vanes. The hub of it may be made to extract the air or the impulsive plan may be used.

EXAMPLES.

Artificial ventilation is used in the Academy of Music, Chestnut St. Theatre, Asylum at Utica, and







St. George's Hall at Liverpool.

Some of Dr. Reid's fans were 10-20 ft. in diameter.

URE'S  
STATEMENT.

Wre says that artificial means give 38 times as much ventilation as natural.

PARKES.

Generally, <sup>method</sup> Parkes believes in the natural mean. It is the simplest, most equable and gives the greatest economy of labor, & is the safest.

<sup>actually obtained, mostly</sup> still

~~With~~ fan ventilation 85 pr. ct. is natural.

TROPICAL  
CLIMATES,  
LARGE  
BUILDINGS, &c.

Some

Artificial means are necessary in tropical climates, large vessels, and factories or other large buildings.

Arnot believes in the exhausting pump.

The new House of Parliament has two towers to draw air down

SEWER  
AIR.

It was attempted to remove sewer air by burning. It was given up.

MEANS  
OF COOLING  
THE AIR.

Means of cooling air: Horizontal fan, as in the Ledger office.

Mat. saturated with water & hung over the door or window.

Underground tunnel as in Italy.



Military Hygiene.



We next take up tents, huts, barracks and hospitals.

TENTS.

Even tents often suffer from bad ventilation. They often need fans.

OUR ARMY  
SIBLY.

The tents used in <sup>U.S.</sup> ~~our~~ army are  
1. The Sibly tent (like a Comanche lodge).  
The edge touches the ground. They cover 1102 cub. ft.

BELL.

2. Bell tent. It has a window with a flap.

OFFICERS'

3. Officers' tent. It is square

HOSPITAL.

4. Hospital tent. It is 15 ft. square. Its walls are 4½ ft. high. It holds 6 men. A tent is the best kind of hospital. It has no hospital gangrene.

WEDGE

4. Wedge tent. It is about 6 ft. long 8 wide & 6 high.

PONCHO.

A poncho is a piece of broadcloth with a hole for the head.

BRITISH ARMY  
&  
FRENCH,

In the British army the hospital tent has two poles. It covers 3360 ft.

A French tent can be taken apart.

HUTS

Wooden huts should have a raised floor with no cellar. It should have



X  
^ In London (1871) 2669 to a square mile



ridge ventilation, and a trench around it for drainage.

EXTEMPORE  
TENTS.

Extempore tents are sometimes made of blankets put on guns.

In their arrangements, they should not touch each other. Each should have 215 sq. yds. That would be 80,000 men to a sq. mile. <sup>+</sup>

TRENCH

A trench should be dug on the side opposite the wind, about 150 yds. from the camp. It should be 10 ft. long & 3 deep. Every morning some of the clay which was removed should be shovelled in.

DESERTED CAMP.

If an old camp is returned to, these ditches <sup>if many</sup> cause disease.

~~Latrines~~ should never be near a spring or stream used for drinking water.

BARRACKS.

In barracks, lung affections and typhoid fever are common. Bad air. A room should hold 24 men. Each man should have 600 cub. ft. of air. They should have but one story.







HOSPITALS.

Hospitals are decidedly a Christian institution. Paula founded at Rome, the first hospital. The word is derived from hospes, guest, and had originally a more extended signification than at present.

JOHN HOWARD.

They were poorly conducted up to a late period. John Howard tried to reform them.

FLORENCE NIGHTINGALE.

Florence Nightingale did much in that direction when possible,

SITUATION.

Hospital wards should be in healthy places, removed from cities.

CONSTRUCTION.

In construction, they should have as large an area as possible. They should be in small detached buildings. If this is impossible, ~~the~~ smaller they are, the better.

COMPARATIVE MORTALITY.

In our army hospitals the mortality was small being only 4 p.c. In London it is 9, Paris 19 and in the Crimea it was 14.

SIZE OF WARD.

A ward should be oblong, 80 ft



End of 20<sup>th</sup> Lecture



long, 25 wide & 16 high (at least). It should hold 24 men. It should have two rows of beds with a window (5 ft. long) for every two beds; ridge ventilation in summer & shaft in winter; floor 3 ft. from the ground ~~stone~~

DIRECTION.

It should run north & south so as to get sun on both sides.

ONE-STORY.

It should be but one story high. If there are more, the upper ones will be more unhealthy than the lower. All our <sup>U.S.A.</sup> new hospitals are one-story high.

ATTIC

An attic above is very good, especially if there is no shade.

CLOSED SQUARE.

The ~~w~~ at the hospital at Naples, in fifteen or ~~ent~~ is the closed square, ~~is small~~ & the build

## NOTES AND QUERIES.

## EXTRACTS FROM DR. ERICHSEN'S ADDRESS ON AMERICAN SURGERY.

"And first, as to the Profession, I may at once say that it appears to me to occupy in America, relatively to the rest of the community, a far higher social status than it does in this country. The reason for this seems tolerably obvious. In the absence of an exalted hierarchy in an established church and of great dignitaries of the law, these professions do not offer sufficient inducement for men of the highest intellectual calibre to enter them. Medicine therefore stands prominent as probably the best-educated, certainly the most scientific, and consequently, in a country where education is so widely diffused and so much regarded, the most respected, of the professions. And in the absence of all titled classes, it can socially more than hold its own in competition with the trading and financial elements which are such prominent constituents of the society of most of the American cities. Perhaps, also, the high position that medicine occupies is owing, in some respect, to the greater uniformity of practice that prevails among medical men in America than with us. For, just as in the Law there is no division into barristers and solicitors, so in Medicine there is none into physicians, surgeons, and general practitioners. Special attitude, inclination, or opportunity will necessarily lead men to a

DIFFERENT ARRANGEMENTS

The ~~w~~ rate & co are arranged in Hamm very good There are Drain

DRAINAGE.

by separate  
They  
of ways  
is a  
ans.  
It should



End of 20th Lecture

.. In America it is attempted to accomplish by improved construction of hospitals, and by close attention to hygienic requirements, those great results which we are here driven to attain by 'antiseptic' methods of treatment. In consequence of the ignorance in all matters that relate to the hygiene of hospitals that prevails among the architects and managers of these institutions, an undue burden of anxiety, responsibility, and care is thrown upon the surgeon, who is now unceasingly engaged in combating septic disease; and in order to keep down that rate of mortality which is the direct consequence of septic hospital influences, he is driven to the employment of elaborate and complicated methods of antiseptic treatment. Cleanliness in its broadest sense is the best and most efficient antiseptic. If the constructors and conductors of hospitals were acquainted with or would adopt those hygienic rules on which hospitals should be built and managed, if hospitals were not overcrowded, if the system of ventilation was perfect, if there was a continuous water-supply, a proper isolation of wards and distribution of patients, the causes of septic diseases would not be generated. Those foul and filthy-begotten diseases, pyæmia and hospital gangrene, would disappear, and antiseptics, in the absence of septic influences, would become unnecessary. Contamination of hospital air would be prevented; we should not, as now under defective hygienic arrangements, first allow the pollution to take place, and then be driven to the use of antiseptics in order to prevent infection of wounds by the already septic-laden atmosphere. Under the present system we begin at the wrong end. Instead of preventing the possibility of atmospheric contamination by perfect hospital hygiene, we allow the septic poison to be engendered, and then, before it can be implanted on the wound, seek to destroy it by the employment of chemical agents.

Erichsen.



long, 25 wide & 16 high (at least). It should hold 24 men. It should have two rows of beds with a window (5 ft. long) for every two beds; ridge ventilation in summer & shaft in winter; floor 3 ft. from the ground ~~stove~~.

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An attic above is very good, especially if there is no shade.

CLOSED SQUARE.

The worst arrangement is the closed square, especially if the square is small & the buildings high.

DIFFERENT ARRANGEMENTS

The wards are now generally separate & connected by corridors. They are arranged in a variety of ways. Hammond hospital (p. 86-top) is a very good arrangement.

DRAINAGE.

There are numerous other plans. Drainage is important. It should.



End of 19th Lecture, 1870.

Worst enemies of the sailor are —  
dampness & foul air together in cool climates —  
heat & foul air in tropical climates —  
foul air everywhere; especially where, as is often the case, &  
the pumps are too short ~~to~~ to remove all the bilge water completely, &  
Excessive stowing of the deck for support chambers should be avoided; &  
every cross should be taken to have all possible cleanliness ~~bottom~~ &  
in the habits of the men. (See Hygiene below as to all the men & below.)

The arrangement of bunks for men is at best unreasonable, or the S. men of men; crowding  
each other, instead of distributing over them  
Lodging room or Emigrant ships;  
chairs & stowage.

Prisons.

Penna. Separate system —  
not "solitary".

Schools!

See Hygiene below as to all the men & below.  
Lodging room or Emigrant ships;  
chairs & stowage.

Hygiene.  
Lodging room or Emigrant ships;  
chairs & stowage.

As much air  
& light as  
possible.

Instead  
of this  
page  
leave  
space



→ Hospitalism ←

not pass under the ward.

EXCESSIVE  
WASHING.

There should not be excessive washing.

CONVALESCENT  
WARDS.

Convalescent wards should be removed from sick ones & should have open corridors.

SEASONS.

The influence of season on health is obvious.

THEIR  
CAUSE.

Seasons are caused by the inclination of the earth's orbit to the equator, & by the revolution of the earth.

DIVISIONS  
OF  
SEASONS.

Our divisions of seasons are arbitrary. The Greek Summer was 131 days, Autumn 51, Winter, 135, & Spring 48.

COLDEST  
TIME.

January is the coldest month North of 48° N. Lat. July is the hottest; south of it, August is hottest.

The 2nd. week of January is the coldest in England. In London the 3rd. week.

WARMEST.

In Summer, the 2nd. week of July is hottest in England. It is 3 weeks later in London.

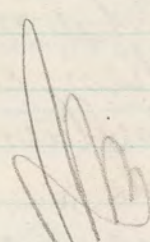
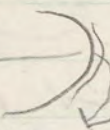


sand mould

Sir John Herschel at Cape Good Hope  $140^{\circ}$  to  $150^{\circ}$ ;

$\nearrow$  glass

$\nearrow$  in cases  $212^{\circ} - 248^{\circ}$



In summer, in Philada., cholera morbus is common till near middle of August; then disappearing; & in suburbs, in certain localities, low grounds, - intermittent Remittent fever.

$\neq$  Among 3 million deaths in diff. countries in Europe

Casper found Spring the most fatal season - summer the least so. It is probably the same here, ~~at least~~ <sup>taking country & city together. In cities, summer is,</sup> on the United States, very destructive to young children. Winter is more so in northern Europe. ~~March~~ here a particularly trying month to consumptives.

October, January & June the months when the practice in Philada.

End of 8<sup>th</sup> Lecture, 1872.

community has the least to do, except when there is some epidemic

End of 23<sup>d</sup> Lecture, 1873.